ENTOMOLOGICAL NEWS

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ENTOMOLOGICAL NEWS

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A Stenogamic Autogenous Strain of Culex pipiens L. in North America (Diptera: Culicidae).

By A. GLENN RICHARDS, Jr., Zoological Laboratory,
University of Pennsylvania.

This preliminary note is to call attention to the fact that the *Culex pipiens* complex in the eastern United States shows a differentiation similar to that shown by this complex in Europe. There it is the only known genetically diverse species or species group of the subfamily Culicinae. However, the problem of anopheline races has recently received attention in this hemisphere (Hoffman, 1936; King, 1939; Hinman, 1940; de Leon, 1940; Vargas, 1941) following the extensive work on the European *Anopheles maculipennis* complex (see Hackett, 1937; Bates, 1940).

During the past two years I have used for histological and other purposes a strain of *Culex pipiens* that apparently established itself in the vivarium of our laboratory years ago. This strain breeds there unattended and maintains itself by breeding continuously during all seasons of the year (Philadelphia, Pennsylvania). Using Roubaud's terminology, this strain is autogenous, *i. e.*, can breed without taking a blood meal, stenogamic, *i. e.*, mates readily in a confined space, and homodynamic, *i. e.*, does not have a true winter diapause although it may hibernate under adverse conditions. In contrast to this strain, there is another strain, also present in the eastern United States, which usually requires a blood meal (non-autogenous or anautogenous), and does not mate in a small space (eurygamic). No data are available on the question of whether or not this anautogenous eurygamic strain has an obligatory diapause (*i. e.* is heterodynamic).

In my laboratory, specimens emerged in small covered aquaria on six different occasions; and left undisturbed they laid viable egg rafts. In one case three successive generations were obtained without any special feeding for adults or larvae and without renewal of the water. In the other cases only one generation was produced, but it is to be noted that the rearing was in clear vivarium water without the added nourishment usually given larvae to speed their development and increase egg-laying. The number of eggs per raft was rather low (30-115, average about 65), and egg-laying did not take place until 5-8 days after emergence.

Observations in our vivarium where the adults fly around the room indicate that the same occurs there. The hundreds of egg rafts that have been seen in the vivarium tanks during these two years have all been relatively small, whereas engorged autogenous and engorged anautogenous females both are recorded as laying considerably larger rafts (150-300 or more eggs). Hundreds of adult females have been observed loose in the laboratory and in the vivarium; no specimen obviously engorged with blood has been seen and 25 randomly captured females on being dissected showed no visible evidence of blood. Finally, although various persons are around the vivarium during the evening, as well as during the day, I have heard only one report of the mosquitoes attempting to bite during the winter and early spring (during summer months there is an influx from out-of-doors).

The preceding observations established the autogenous character of this line. I must add that not all females lay eggs although some did in every batch tested. In the three aquaria that were set-up specifically to observe this (at different times), there were never as many egg rafts as there were females. Also, in one of the six cases treated some of the egg rafts were non-viable, presumably having been laid by virgin females (it is well known that eggs from virgin female mosquitoes are not viable). This agrees with European data which shows 40-86% of the females of autogenous lines capable of laying

eggs (only 46-94% lay eggs if allowed to engorge with blood) (Tate & Vincent, 1936).

The data cited for the autogenous characteristic also indicate ability to mate in confinement (stenogamy). In addition to this presumptive evidence, pairs have been seen copulating on the sides of the aquaria during the daytime on a number of occasions. In the observed cases the male was resting on the side of the container and the female seemed to be the aggressor since she flew around the male and eventually came to rest on top of him. Copulation ensued, the male appearing passive throughout the entire performance. Mating has been observed in a round jar with an air-space of approximately 6¼ x 6 inches (200 cu. in.), and judging from viable egg rafts must have occurred in a round jar of approximately 5 x 5 inches (115 cu. in.).

For the third character (homodynamic development), there is obviously no seasonal interruption in our moderately heated vivarium. In our unheated frog room adults continue activity until ice is present out-of-doors and larvae continue to develop in spite of some ice in the aquaria each night. On warmer days pupation occurs. The winter temperature of this room is too low for adult activity, and only the one brood of larvae occurs after the appearance of ice during the night.

I accidentally discovered another interesting feature of this strain, namely its lack of phototropism. Adults are not attracted to lights in the laboratory, and while they usually rest in the darker *damp* places, they commonly fly around during the day. In January, 1941, I gave some hundreds of larvae and pupae to Mr. H. B. Weiss for use in his studies on light reactions. Mr. Weiss writes that he tested 64 adults in three different trials several days after emergence and that they failed to react either positively or negatively to different wave lengths of light (for his technique see Weiss, Soraci & McCoy, 1941). This contrasts with definite reactions obtained by him for the yellow-fever mosquito, *Aedes aegypti,* but agrees with the indifference to light reported by Tate & Vincent (1936) for European autogenous strains.

The idea of two strains of *Culex pipiens* is also supported by field observations made on Long Island, New York. These observations taken alone have little or no validity, but are most amenable to the idea of two strains existing there. On Long Island, larvae of *C. pipiens* are occasionally found in small numbers in water containing some ice. Occasional reports come in of winter activity—in one case in February, 1941, Mr. D. E. Longworth sent me series including as many males as females; yet only females are known to hibernate, so this could hardly represent emergence of a diapausing group. Aquaria placed on exhibit there during the summers of 1936 and 1937 sometimes gave adults showing stenogamic autogenous characteristics, but in most cases no egg rafts were produced (exhibits at different times and larvae from various sources). Light traps used to sample mosquito populations usually produced satisfactory samples (positive phototropism), but in certain areas produced no *C. pipiens,* although adults were fairly common within the immediate vicinity of the trap. This may have been due to the inconsistency of trap-light efficiency, but it is also possible that it reflects the absence of phototropism found for my autogenous strain by Mr. Weiss and recorded for the European strain by Tate & Vincent.

The presence of autogenous individuals in the United States has already been recorded by Mitchell (1907) and Huff (1929) but these authors did not recognize the inherited nature of this characteristic. In Europe Roubaud (1929-1933), Weyer (1935), Tate & Vincent (1936), Marshall & Staley (1935-1937), Mathis (1940) and others have shown that the biological characteristics are definitely inherited. Claims have been made by Roubaud and Weyer that stenogamy versus eurygamy and autogeny versus anautogeny are simple Mendelian characters, but this is disclaimed by Tate & Vincent, who cite extensive experiments showing that within pure strains the characteristics were maintained for the duration of the 49 generations bred but that cross-breeding results were peculiar and certainly not genetically clear. Tate & Vincent also point

out that stenogamy is the best of the biological characteristics because of the great variability (40-86%) in the expression of the autogenous characteristic.

Marshall & Staley consider the autogenous and anautogenous forms in Europe to represent separate species. They retain the name *C. pipiens* L. for the anautogenous form and resurrect the name *C. molestus* Forskal for the autogenous form. The situation in this country certainly differs from that in England. In structural characters my autogenous strain does not agree with the description of *C. molestus* as given by Marshall & Staley. The males, while usually having the first four palpal joints somewhat shorter than the proboscis, commonly have longer palpi; the number of setae on the lobes of the ninth abdominal tergite is less (averaging even less than in the British anautogenous form), and the number of branches in each tuft of the respiratory siphon averages less. From the biological point of view, I have seen no indication that our anautogenous strain shuns human blood—in fact the contrary is true. The autogenous strain of this laboratory seldom seeks human blood, although autogenous lines at times certainly are pests of humans in this country; in Europe the autogenous form is reported as always an avid feeder on humans. It seems probable, therefore, that although stenogamic autogenous and eurygamic anautogenous lines occur in the eastern United States, we do not have an exact duplicate of the European situation.

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A List of Butterflies Which May be Found Within 50 Miles of Philadelphia. (Lepid.: Rhopalocera).

By R. C. WILLIAMS, Jr., Research Associate, Acad. Nat. Sciences, Philadelphia.

The nomenclature follows that of Macy & Shepard's recently published "Butterflies".

The rare or doubtful species are indicated by an asterisk. Authentic data on the occurrence of any of these or of any species omitted from the list will be appreciated by the American Entomological Society or the writer.

PAPILIO

1 PHILENOR L.
2 AJAX L.
3 CRESPHONTES Cr.
4 GLAUCUS L.
♀ f. TURNUS L.
5 TROILUS L.
6 MARCELLUS Cr.

ANTHOCHARIS

7 MIDEA Hüb.

COLIAS

8 EURYTHEME Bd.
f. KEEWAYDIN Edw.
f. ERIPHYLE Edw.
f. AMPHIDUSA Bd.
9 PHILODICE Godt.

ZERENE

10 CESONIA Stoll.

PHOEBIS

* 11 SENNAE L.
r. EUBELE L.

EUREMA

12 LISA Bd. LeC.
13 NICIPPE Cr.

PIERIS

14 PROTODICE Bd. LeC.
15 NAPI L.
f. OLERACEA Har.
16 RAPAE L.

DANAUS

17 PLEXIPPUS L.

ENODIA

18 PORTLANDIA F.

MEGISTO

19 MITCHELLII French
20 EURYTUS F.

SATYRODES

21 EURYDICE Johan.

MINIOS

22 ALOPE F.
r. MARITIMA Edw
* r. NEPHELE Kir.

DIONE

* 23 VANILLAE L.

EUPTOIETA

24 CLAUDIA Cr.

ARGYNNIS

25 IDALIA Dru.
26 CYBELE F.
27 APHRODITE F.
* 28 ATLANTIS Edw.

BRENTHIS

29 MYRINA Cr.
30 BELLONA F.

EUPHYDRYAS

31 PHAETON Dru.

PHYCIODES
32 NYCTEIS West.
33 THAROS Dru.
f. MARCIA Edw.
f. MORPHEUS Edw.
* 34 BATESII Reak.

POLYGONIA
35 INTERROGATIONIS F.
36 COMMA Har.
f. DRYAS Edw.
* 37 SATYRUS Edw.
38 FAUNUS Edw.
* 39 PROGNE Cr.

NYMPHALIS
40 J-ALBUM Bd. LeC.
* 41 MILBERTI Godt.
42 ANTIOPA L.

VANESSA
43 ATALANTA L.
44 VIRGINIENSIS Dru.
45 CARDUI L.

JUNONIA
46 COENIA Hub.

BASILARCHIA
47 ARTHEMIS Dru.
hy. f. PROSERPINA Edw.
48 ASTYANAX F.
49 ARCHIPPUS Cr.

ASTEROCAMPTA
50 CELTIS Bd. LeC.
51 CLYTON Bd. LeC.

LIBYTHEA
52 BACHMANII Kirt.

NYMPHIDIA
* 53 BOREALIS Gr. Rob.

ATLIDES
* 54 HALESUS Cr.

STRYMON
* 55 CECROPS F.
* 56 M-ALBUM Bd. LeC.
57 MELINUS Hüb.
* 58 FAVONIUS Ab. Sm.
* 59 TITUS F.
60 ACADICA Edw.
61 EDWARDSII Saund.
62 FALACER Godt.
63 LIPAROPS Bd. LeC.

MITOURA
64 DAMON Cr.

INCISALIA
65 AUGUSTUS Kir.
* 66 IRUS Godt.
67 HENRICI Gr. Rob.
68 POLIOS Cook Wats.
69 NIPHON Hub.

FENISECA
70 TARQUINIUS F.

LYCAENA
71 THOE Gray.
* 72 EPIXANTHE Bd. LeC.
73 HYPOPHLEAS Bd.

EVERES
74 COMYNTAS Godt.

GLAUCOPSYCHE
75 LYGDAMUS Doub.

LYCAENOPSIS
76 PSEUDARGIOLUS Bd. LeC.
r. LUCIA Kir.
f. MARGINATA Edw.
f. NEGLECTA Edw.

URBANUS
77 PROTEUS L.

PROTEIDES
78 CLARUS Cr.

ACHALARUS
79 LYCIADES Gey.

AUTOCHTON
* 80 CELLUS Bd. LeC.

THORYBES
81 BATHYLLUS Ab. Sm.
82 PYLADES Scud.
f. IMMACULATA Skin.

PYRGUS
83 COMMUNIS Grote.
* 84 CENTAUREAE Ramb.

PHOLISORA
85 CATULLUS F.
* 86 HAYHURSTII Edw.

ERYNNIS
87 ICELUS Scud. Burg.
88 BRIZO Bd. LeC.
89 MARTIALIS Scud.
* 90 LUCILIUS Scud. Burg.
* 91 BAPTISAE Forbes.
92 PERSIUS Scud.
93 JUVENALIS F.
94 HORATIUS Scud. Burg.
* 95 ZARUCCO Luc.

CARTEROCEPHALUS
* 96 PALAEMON Pall.

ANCYLOXYPHA
97 NUMITOR F.

HESPERIA
98 SASSACUS Har.
* 99 UNCAS Edw.
100 LEONARDUS Har.
*101 METEA Scud.
*102 ATTALUS Edw.

HYLEPHILA
103 PHYLEUS Dru.

ATALOPEDES
104 CAMPESTRIS Bd.

POLITES
105 THEMISTOCLES Lat.
106 MANATAAQUA Scud.
107 VERNA Edw.
108 PECKIUS Kir.
109 MYSTIC Scud.
110 BRETTUS Bd. LeC.

WALLENGRENIA
*111 OTHO Abb.-Sm.
r. EGEREMET Scud.

POANES
112 HOBOMOK Har.
♀ f. POCAHONTAS Scud.
113 ZABULON Bd. LeC.
114 MASSASOIT Scud.
f. SUFFUSA Laurent.
* r. HUGHI Clark.
*115 AARONI Skin.
116 VIATOR Edw.

ATRYTONE
117 RURICOLA Bd.
118 BIMACULA Gr. Rob.
*119 AROGOS Bd. LeC.
120 LOGAN Edw.
121 CONSPICUA Edw.
122 DION Edw.

ATRITONOPSIS
123 HIANNA Scud.

LEREMA
124 ACCIUS Ab. Sm.

AMBLYSCIRTES
125 VIALIS Edw.
126 HEGON, Scud.

LERODEA
127 L'HERMINIER Lat.

CALPODES
128 ETHLIUS Cr.

PANOQUINA
129 OCOLA Edw.
130 PANOQUIN Scud.

The Genus Colias in North America (Lepidoptera: Pieridae).

By Austin H. Clark, U. S. National Museum,
Washington, D. C.

(Continued from page 187.)

The dark border of the wings in the males is exceedingly variable, ranging from vestigial to very dark and broad, 7 mm. wide at the narrowest point in a specimen with the fore wings 30 mm. long. In a long-winged spring male with the fore wings 22 mm. long, taken on April 12, 1938, the border of the fore wings below vein 4 is represented by a fine diffuse dusting of dark scales forming a series of narrow crescents, with the convexity inward, one in each interspace. Anterior to vein 4 the dark dusting in the interspaces extends further and further inward so that the whole apex is dusted with dark scales; the infuscated apical area is crossed by broadly yellow veins and there is a marginal more or less semicircular yellow spot at the outer end of each interspace. On the hind wings there is a dusting of dark scales at the ends of the interspaces between veins 4 and 5, 5 and 6, and 6 and 7, that between veins 5 and 6 the most extensive, that between veins 6 and 7 smaller, and that between veins 4 and 5 very slight. The margin of the wing beyond these small patches of dark scales is narrowly yellow.

The reduction of the dark border in the males to a rather faint and very narrow submarginal dusting of dark scales is rare; usually the border is continuous and dark, and the dark scales extend outward to the base of the fringe. On the fore wings the dark border varies in width in its lower half from scarcely more than one-third of an interspace to more than twice the width of an interspace. Most commonly it is approximately the width of an interspace, often slightly more or slightly less.

When the border of the fore wings is narrow its inner edge is frequently deeply indented by long narrow angles running inward along the veins, and the veins may cross it as narrow yellow lines. Most commonly, however, only the veins at the apex are yellow, and these do not quite reach the outer edge. When the dark border is broad the inner edge may be more or less deeply scalloped, the black of the border extending outward as long narrow angles along the veins. In most cases the inner edge of the dark border is simply irregular.

In the males the dark border of the hind wings is developed proportionately to that of the fore wings. It may reach downward to vein 1, but usually ends at about vein 2. When the border is narrow it may not pass vein 3, and in extreme cases it is developed only between veins 6 and 4.

In the females the inner edge of the dark border of the fore wings is abruptly bent inward in the interspace between veins 3 and 4. Rarely it is broadly curved inward in its anterior half as is the case in *C. werdandi.* The inner edge of the border is usually very irregular, though occasionally smooth. The spots in the dark border vary greatly in size, being largest in the small light orange individuals. They are usually of different sizes, that in the interspace between veins 3 and 4 being much smaller than the others or absent. Rarely they are large and subequal and more or less confluent, forming a partially interrupted broad yellow band separated from the orange or yellow of the inner portion of the wing by a narrow dark band of uniform width broadly and evenly curved in its anterior half. Not infrequently the spots are entirely absent, the black border then closely resembling that of the male. In spring individuals the dark border is narrower than it is in summer individuals, and below vein 4 the inner portion may be narrow, vestigial, or even entirely absent, the dark border of the female then resembling approximately that of the male except for the inclusion of a curved row of four spots in the apical portion. Similar borders are found in the south Russian forms *chryseis* and *diana* of *C. erate.*

On the hind wings in the females the dark border may be narrow, resembling that of the male though with the inner edge vaguely defined. Sometimes it is as broad and continuous as it is on the fore wings with the inner edge well defined and parallel to the edge of the wings, and completely enclosing a row of subequal yellow spots, largest anteriorly, one in each interspace, much as in the females of *C. eogene* from Kashmir. Usually it is broad anteriorly where it completely encloses from one to three spots, the inner border then becoming obsolescent or represented by a slight dusting of dark scales in the interspaces. Occasionally the border is represented merely by long narrow dark triangles with their bases outward that extend inward along the veins. Rarely it is wholly absent, there being merely a few dark scales at the outer ends of the anterior veins.

The spot at the end of the cell of the fore wings is usually well developed, black, and conspicuous, sometimes with an orange, yellow, or white center. Rarely it is much enlarged,

taking the form of a black circular ring surrounding a white center. It may be reduced to a narrow line, or even vestigial, represented simply by a few dusky scales. Not infrequently it is produced into a more or less extended angle on the side toward the apex. It may be bright orange instead of black. In pale orange early spring individuals it is commonly more or less broadly bordered with orange or mixed with orange scales, sometimes entirely orange.

The spot at the end of the cell of the hind wings varies from pale straw yellow to orange red. In light orange spring individuals it is sometimes very large, its greatest diameter, parallel to the cell, being as great as the maximum width of the cell. Usually it is somewhat less in diameter than the width of the interspace between veins 4 and 5. Rarely it is very small, only about one-third the width of this interspace. There is usually a small supplementary spot on its outer side just across vein 5, but this may be absent, especially if the spot be small.

The wing bases above are usually marked with blackish scales. In the males these may be very dark, and the blackish patch is sometimes extended as a sooty infuscation along the lower border of the fore wings half way to the outer margin, and also on the hind wings in the interspace between veins 1 and 2 and the lower half of the cell downward almost to the anal angle. In the females the infuscation is less dense than in the males, but more extensive. On the fore wings it may be confined to the costal border, though it commonly affects about the basal third of the fore wings and the area below the cell in the hind wings, becoming diffuse toward the outer edge. Occasionally the entire hind wing is infuscated except for a light marginal band or row of more or less indistinct spots.

In the females the veins of the fore wings for their whole length and the outer half of the veins of the hind wings may be narrowly blackish. Rarely in the males all the veins may be marked by narrow back lines. I have not seen an example of this last variety from Washington but Mr. Wagner has taken it in Nebraska.

The hind wings on the under side may be clear yellow, usually darker than on the upper side, yellowish white, yellowish orange, dull white, or grayish blue. They are usually more or less heavily dusted with dark scales, when the dusting is heavy becoming dusky olive yellow and in extreme cases in winter dull green with a broad indefinite lighter border.

The antemarginal spots on the under side of the fore wings are usually well developed with the three lowest the largest. In

the forms with very narrow dark borders above they may be as much as four times as far from the edge of the wings as the inner edge of the dark border; in the forms with broad borders they may be somewhat nearer the edge of the wing than the inner edge of the dark border. Usually they are approximately under the inner edge of the dark border, in most of the yellow males slightly further from the edge of the wings. This line of spots is usually straight and parallel with the outer edge of the wings, but it may be somewhat curved inward, especially in yellow males. In males in which the dark border is narrow, the outer edge of the fore wing markedly convex, and the spot at the end of the cell of the hind wings small and that at the end of the cell of the fore wings vestigial the spots are greatly reduced and not infrequently wholly absent.

The fringes of the wings vary from light dull olive with or without a pink edging to entirely bright pink. They are usually more or less dull rosy or pinkish.

This composite description covers all forms between the most extreme *eurytheme* (form *amphidusa*) and the most extreme *philodice*, including the yellow phase or variety of *eurytheme* and *eriphyle*. Two of the spring males if their origin were unknown would almost certainly be referred to *pelidne*.

To the insects included in the description 46 different names, covering species, subspecies, forms, and aberrations, have been applied. These names are usually divided between two accepted species, *eurytheme* and *philodice*. There is, however, no character or group of characters by which *eurytheme* and *philodice* may be distinguished. Originally in the east *philodice* ranged from the highlands of Georgia and the lowlands of northern North Carolina northward, becoming more and more distinctive toward the northeast. *Philodice* therefore is (or was) the northeastern representative of *eurytheme*.

Toward the west *philodice* intergrades insensibly with *eriphyle*, which is only an extreme form (with the subcentral spot on the upper surface of the secondaries reduced) of the yellow phase of *eurytheme*. Toward the northwest *eriphyle* passes into the more distinctive *kootenai*, and in the extreme south into *guatemalana*.

Comparison between *eurytheme* and the European and Asiatic *chrysotheme* fails to show any features by which the two may be differentiated; *eurytheme* and the forms associated with it should therefore be regarded as forms of *Colias chrysotheme* (Esper). The significant forms having a more or less definite significance are:

COLIAS CHRYSOTHEME (Esper)

Colias chrysotheme eurytheme Boisduval
Colias chrysotheme eriphyle W. H. Edwards
Colias chrysotheme kootenai Cockle
Colias chrysotheme philodice Godart
Colias chrysothema guatemalana Staudinger

The four yellow forms (*eriphyle, kootenai, philodice,* and *guatemalana*) occupy mainly, or largely, distinctive areas. The orange *eurytheme,* which has a yellow phase running directly into *eriphyle,* covers most of the range of *eriphyle* and part of the ranges of *kootenai* and *philodice.*

The relation of *Colias chrysotheme* to the other species of *Colias* in North America may be made clear by a brief analysis of the genus as a whole. The species of *Colias* fall naturally into five groups, as follows: 1. The *Crocea* group; a mealy patch at the base of the secondaries above; chiefly orange; Asia, Europe, Africa, and South America, with one species (*meadii*) in western North America. This passes into: 2 The *Hecla* group; no mealy patch; under side of secondaries green; chiefly orange; Alpine and Arctic in Asia, elsewhere Arctic, with one species (*hecla*) in northern North America. 3. The *Werdandi* group; an extreme development of the preceding; upper side also green or greenish and sexes similar; Alpine and Arctic in Asia and Europe, in North America Arctic (various forms of *werdandi*) and Alpine (*behrii* in California). The two following groups are distinct from the three preceding. 4. The *Hyale* group; no mealy spot; beneath usually yellow, sometimes orange, gray, or bluish; often infuscated; an antemarginal row of spots on the under side of the fore wings; sexes similar or different; chiefly yellow, sometimes orange, white or gray-blue; Asia, Europe, and Africa,

with one species (*chrysotheme*) over almost the whole of North America. 5. The *Palaeno* group; essentially as in the northern yellow forms of *chrysotheme* but without the antemarginal spots on the primaries below and with the dark margins in the females usually obsolescent; yellow, rarely white, the males of some species with an orange form; chiefly in the Rocky Mountain region and in boreal and subarctic North America; two species in Alpine and Arctic Asia and Europe; in North America represented by *occidentalis, harfordii, interior, christina, alexandra, gigantea, scudderii, pelidne,* and *palaeno.*

Some Unusual Dragonfly Records from New Jersey (Odonata).

By JOHN GILLESPIE, Glenolden, Pennsylvania.

During the past summer, while collecting dragonflies in New Jersey, I obtained five males and one female of *Celithemis verna* Pritchard. They were taken on July 12 and July 20, at Bennett, which is located in Cape May County, on the peninsula at the southern extremity of the state. This species was originally described in 1934 by Pritchard from specimens taken in Oklahoma and Georgia. Its occurrence in a region so far to the northeast as New Jersey seems particularly noteworthy. The identification has been confirmed by Dr. P. P. Calvert.

The environment in which *verna* was found consisted of an extensive boggy swamp and an adjoining sphagnum bog. The greater number were observed at the swamp, which was boggy around the edges, but with a large amount of open water in the middle. Several individuals in addition to those captured were seen.

Other species of *Celithemis* occurring here were *elisa, martha* and *eponina.* Some of the more noteworthy of the twenty-five species of dragonflies observed at Bennett, besides

verna, were *Anax longipes, Pantala hymenaea, Enallagma pictum,* and *Nehallenia gracilis.*

Other interesting captures were:

DOROCORDULIA LEPIDA (Hagen). Lake near Kirkwood, June 22.

CELITHEMIS MONOMELAENA Williamson. Keswick Grove, August 6; Atco, August 16.

ENALLAGMA CARUNCULATUM Morse. Lenape Lake, near Newton, August 31.

E. WEEWA Byers. Cedar stream at Chatsworth, August 3; two different localities on cedar streams between Whiting and Bamber, August 6.

E. DIVAGANS Selys. Cedar stream between Whiting and Bamber, August 6.

TELEALLAGMA DAECKII (Calvert). Reedy edge of lake near Newtonville, July 12.

NEHALLENIA INTEGRICOLLIS Calvert. Same as above.

ARGIA BIPUNCTULATA Hagen. Chatsworth and Keswick Grove, August 3.

A "Zippered" Sweeping Net.

A very convenient sweeping net for micro-diptera was made of heavy unbleached muslin. The net tapered below to an open bottom of about five inches in diameter. To this bottom rim one side of a coat zipper (the type in which the two sides of the zipper may be completely separated) was sewn. Two or more cup-shaped bags were made whose rims were the same diameter as the open bottom of the net. To the rim of each cup-bag the opposite side of a coat zipper was sewn. Thus when zippered together a complete net was formed with quickly interchangeable bottoms. The cup part when swept full of insects and debris was tied with tapes near its mouth, un-zippered and inserted into a large cyanide bottle. Another cup-bag was zippered onto the net and the sweeping continued while the first lot of insects was being killed.—ELIZABETH G. FISHER, The Academy of Natural Sciences of Philadelphia.

Notes on some Rare Scarabaeidae with the Description of One New Species. (Coleoptera).

By MARK ROBINSON, Sharon Hill, Pennsylvania.

For a long time it was apparent to me that some of our species of *Trox*, which were never found in the usual places where I had looked for them but where I found many other species, must be specialized, just like some of our *Aphodiini* and other *Scarabaeidae*. With this in mind I set out this spring to prove or disprove this theory. I had several clues on which to work viz: material collected by Sim and Frost, plus several specimens from unidentified sources.

The method used was to scour the woods for birds building their nests in the early spring and, after the birds had raised their young, collect the nests and examine them bit by bit. The nests ranged from ten to seventy feet in the air and were in a great variety of trees including Beech, White Oak, Chestnut, Sycamore, Red Maple, Tulip Poplar, Norway Spruce and White Pine.

In the case of such birds as crows, titmice and other Passerines, the *Trox* are feeding on the feathers used to line the nest or the hairs which crows will intertwine through their nests; hawks' and owls' nests will always have scattered through them hair and feathers from the mammals and birds with which the Raptores had fed their young. In order for the *Trox* to be able to subsist in these nests, the nests must be very thick, or be in the cavity of a tree, in order to preserve the moisture which the larvae must have in order to mature.

The nest which proved to be the most productive was that of a barn owl at Broomall, Pennsylvania. This abode was located about twenty feet above the ground in the hollow of a dead Chestnut tree. I have collected *Trox* in these woods for the past eight years without ever taking any of the species that were collected in this nest. These consisted of over five hundred specimens of *striatus, aequalis, affinis* and the new species described in the following pages.

Thanks are due to the following men for their assistance in

locating nests or otherwise helping in the studies undertaken in this paper: Nelson D. Hoy, Robert M. Stabler, R. C. Casselberry, M. W. Sanderson, R. J. Sim, C. A. Frost and R. Swett.

Trox (Omorgus) tytus new species.

It is remarkable that an insect as large as this could have remained out of the hands of taxonomists and collectors as long as has been the case. Until I examined the material taken in the Broomall Owl nest I had never seen this species and yet I have seen most of the large collections of *Trox* in this country.

The nearest known species to this one is *suberosus Fab.*, but *tytus* is smoother through-out, and the side margins of the pronotum are straight and not incised as they are in *suberosus*. In addition to the external characters, the male aedeagus has a very different shape. All the specimens in the type series were taken in barn owl (*Tyto alba pratincola* Bonap.) nests.

Fig. 1. Dorsal view of aedeagus of *Trox tytus*.

Oblong; completely covered with a yellowish-brown granule-pollinose, opaque coating. Interspersed over the body are yellowish-brown scale like hairs, which are a little more concentrated on the elytral tubercules. The underparts of the head and anterior tips of the tibiae are reddish and shining.

Clypeus triangular, rather strongly reflexed laterally. On either side of the median line and just to the rear of the genae is an elongate, deeply excavated pit. Head rounded without trace of tubercules.

Pronotal sides arcuate, converging to the rounded hind angles in the posterior one-sixth, sinuation within the hind angle well pronounced. Hind margin rounded medially, sinuate on each side. On the disk of the pronotum is an ill-defined median groove which runs posteriorly into a deeply, transversely excavated pit;. the sides of this pit are sloping. The usual tubercules of this subgenus are but vaguely indicated on the pronotum.

The elytral tubercules are low, barely rising above the plane of the intervals. The tubercules on the first and sutural rows are elongate and sometimes longitudinally confluent, the tubercules on the lateral rows are oval to rounded. The intervals are biseriately punctured. Humeral umbone moderately prominent while the apical umbone is indefinite.

Scape of antennae reddish, bristling with long ochraceous-orange hairs; funicle fulvous, glabrous; club testaceous. Apical process of anterior tibiae bifid, side margin of tibiae with a sharp denticle just back of the anterior process.

Wings: Length, 18 mm.; Breadth, 6.25 mm. Length, 12 to 13 mm.; Breadth, 7 to 8 mm.

Type.— ♂ Broomall, Delaware County, PENNSYLVANIA, June 14, 1941 (Mark Robinson). *Allotype.*— ♀, With same data as type.

Paratypes.—190 of both sexes; 162 Broomall, Pennsylvania, from May 29, 1941 to June 20, 1941 (Mark Robinson); 4 Broomall, Pennsylvania, June 1, 1941 (R. Stabler); 24 Lyndell, Pennsylvania, June 18, 1941 (Mark Robinson). Paratypes will be deposited in the collections of: Academy of Natural Sciences of Philadelphia; American Museum of Natural History; Museum of Comparative Zoology; United States National Museum; University of Kansas; O. L. Cartwright; M. A. Cazier; R. C. Casselberry and the writer.

TROX SIMI Robinson. 1940. Trans. Amer. Ent. Soc. LXVI, p. 157.

The type series of this species consisted of fifteen specimens found in New Jersey, Pennsylvania and Virginia. The food records I had at the time of description were: Hen feathers, mouse hair, dead crow, dead mole, old carpet and owl pellets. This year I have found ninety-two specimens in Broomall, Darby and Sharon Hill, Delaware County, Pennsylvania, from

April 28 to June 19. All specimens were found feeding on Barn Owl (*Tyto alba pratinicola* Bonap.) pellets which were disgorged on the ground beneath the trees in which the owls roosted.

TROX AEQUALIS Say. 1832. Say, New Harmony, p. 5.

This species seems to be found in a great variety of mammal and bird nests, as prior to 1941 I had only collected one specimen; this was on an old felt hat on the ground at Broomall, Pennsylvania, June 12, 1934. This year I collected between two and three hundred specimens in the nests of crows (*Corvus brachyrchynchos Brehm*), screech owl (*Otus asio naevius* Gmelin), great horned owl (*Bubo virginianus* Gmelin), barn owl (*Tyto alba pratinicola* Bonaparte), tufted titmouse (*Baeolophus bicolor* Linnaeus), hawk (*Buteo* sp.) and gray squirrel (*Sciurus carolinensis* Gmelin). All specimens were collected in Chester or Delaware Counties, Pennsylvania, between May 11 and June 15, 1941. In addition I have seen specimens collected in the nests of turkey vulture (*Cathartes aura septentrionalis* Wied) and the starling (*Sturnus vulgaris* Linnaeus).

TROX AFFINIS Robinson. 1940. Trans. Amer. Ent. Soc. LXVI, p. 158.

At the time I wrote the original description of this form I thought it was a subspecies of *Trox aequalis* Lec. Since then I have examined specimens from New York, Pennsylvania, Maryland, Virginia, Iowa, Kansas and California. While I haven't found any more characters to separate the two species I think the larger size, different male genitalia and lack of intermediate specimens are sufficient to rank it as a separate species.

In addition to the type series of fifty-nine specimens collected in various localities in New Jersey, which were all collected in crows' nests, I have collected twenty-four specimens in four different crows' nests this spring and Dr. Robert M. Stabler collected two specimens in Chester County on May 18, 1941, in a crow's nest. In the great horned owl nest which I examined on June 18, 1941, I collected fifty-two specimens of

this species. I believe the reason for the large number of specimens being found in this Owl's nest is that the owl had used a last years crow's nest as the basis for its own nest and the *Trox,* when they matured this year, started to feed on the hair of rabbits and feathers of pheasants and grouse, which remains were found in the nest.

TROX STRIATUS Melsheimer. 1846. Proc. Acad. Nat. Sci. Phila. II, p. 137.

This species has always been rare in collections and was one of the species I endeavored to trace to a definite host. In the barn owl's nest at Broomall, I took several hundred specimens of *striatus* along with the other *Trox* and *Hister* collected there. In addition I collected it in the nest of a barn owl at Lyndell, Pennsylvania, on June 18, 1941, a great horned owl's nest at Cupola, Pennsylvania, on the same date, and screech owl's nest at Chester Heights, Pennsylvania, also yielded several specimens on June 15, 1941.

Conjointly with the above biological data is the record of Sim's that he collected several specimens in May and June, 1930 at Moorestown, New Jersey, in the nest of a barn owl. All of these records add up to but one conclusion, that *Trox striatus* is found in the nests or nesting cavities of our species. of owls.

TROX LATICOLLIS Leconte. 1854. Proc. Acad. Nat. Sci. Phila. VII, p. 213.

This species was always very rare in collections until Mr. C. A. Frost collected over twenty-five specimens in May, 1939, in a fox den at Natick, Massachusetts. Since then Dr. Milton W. Sanderson sent me four specimens which he found feeding on a dead fox in a cave in Washington County, Arkansas, on November 12, 1938. On July 1, 1941, I took one specimen in the den of a gray fox (*Urocyon cinereoargenteus* Schreber) at the Springton Dam in Delaware County, Pennsylvania.

APHODIUS MANITOBENSIS Brown. 1928. Can. Ent. LX, p. 302.

Mr. Robert Swett presented to me a male specimen of this

species which he collected at Canadensis, Pennsylvania, in March, 1939, in the ground under a pile of white-tailed deer (*Odocoileus virginianus* Boddaert) excrement. At the time that the specimen was collected there was frost in the ground and patches of snow here and there on the surface.

Mr. W. J. Brown, who described the species and compared this specimen with the type stated that this was only the second specimen he had seen.

APHODIUS OBLONGUS Say. 1823. Journ. Acad. Nat. Sci. Phila. III, p. 215.

Four specimens of this rare species were taken by myself at Broomall, Pennsylvania, in two gray squirrel (*Sciurus carolinensis* Gmelin) nests on June 14, 1941. Both nests were in cavities of dead chestnut trees about thirty feet above the ground. They were composed of piles of leaves which were chewed into small pieces. Whether the *Aphodius* were feeding on the decomposing leaves or the squirrel excrement scattered through the nest I was unable to determine.

PHYLLOPHAGA POSTREMA Horn. 1887. Horn, Tran. Amer. Ent. Soc. XIV, p. 233.

This rather rare Melolonthid was taken by myself for the first time in New Jersey at White's Bogs on June 24, 1939. Six specimens were found feeding at night on tupelo (*Nyssa sylvatica* Marsh.), sweet fern (*Myrica asplenifolia* L.) and blueberry (*Vaccinium virgatum* Ait.).

Tabanidae of Panama (Diptera).

The annual report of the Gorgas Memorial Laboratory, located in Panama City and in three field stations, for 1940, states that Mr. G. B. Fairchild, Junior Entomologist continued work on the Tabanidae of Panama. "A considerable number of species were added to the collections and three papers on the group were prepared. Two additional species were reared from larvae. In February, the services of a reliable native were secured which enabled collections to be made at one spot every two weeks. When a year's collection has been gathered, it will enable us to gain a very fair idea of the seasonal abundance of the various species."

Current Entomological Literature

COMPILED BY V. S. L. PATE, L. S. MACKEY and J. W. CADBURY.

Under the above head it is intended to note papers received at the Academy of Natural Sciences of Philadelphia pertaining to the Entomology of the Americas (North and South), including Arachnida and Myriopoda. Articles irrelevant to American entomology will not be noted; but contributions to anatomy, physiology and embryology of insects, however, whether relating to American or exotic species will be recorded.

This list gives references of the current or preceding year unless otherwise noted. All continued papers, with few exceptions, are recorded only at their first installment.

For records of Economic Literature, see the Experiment Station Record, Office of Experiment Stations, Washington. Also Review of Applied Entomology, Series A, London. For records of papers on Medical Entomology, see Review of Applied Entomology, Series B.

Note. References to papers containing new forms or names not so stated in titles are followed by (*); if containing keys are followed by (k); papers pertaining exclusively to neotropical species, and not so indicated in the title, have the symbol (S) at the end of the title of the paper.

The figures within brackets [ ] refer to the journal in which the paper appeared, as numbered in the list of Periodicals and Serials published in our January and June issues. This list may be secured from the publisher of Entomological News for 10c. The number of, or annual volume, and in some cases the part, heft, &c., the latter within ( ) follows; then the pagination follows the colon :

Papers published in the Entomological News are not listed.

GENERAL.—Anon.—Dr. Lee Strong dies in Arizona. [4] 73: 114-115. **A. W. B.**—Professor Lawson Caesar retires. [4] 73: 97-98, ill. **Crabb, E. D.**—Abbreviation of names of biological publications. [Univ. Colo. Studies] 1 (D): 177-191. **Davis, J. J.**—Willis Stanley Blatchley. [7] 34: 279-283, ill. **Fossa-Mancini, E.**—Noticias sobre hallazgos de insectos fosiles en la America del sur. [Notas Mus. de la Plata] 6: 101-140. **Riley, et. al**—Catalogue of the books, manuscripts, maps and drawings in the British Museum (Nat. Hist.). Vol. 8: 969-1480. **Smart, J.**—Instructions for collectors. No. 4A. Insects. [Brit. Mus. Nat. Hist.] 1940: 164 pp., ill. **Torre-Bueno, J. R.**—A useful catalogue. [19] 36: 128. Compendium of entomological methods-Pt. 2. Orthoptera. [19] 36: 136. **Turner, H. J.**—Notes on nomenclature. 1. [21] 53: 63-67. **Williams, E. C.**—An ecological study of the floor fauna of the Panama Rain Forest. [Bull. Chicago Acad. Sci.] 6: 63-124, ill. **Wood, S. F.**—A method of collecting and transporting cone-nosed bugs. [19] 36: 137-139, ill.

ANATOMY, PHYSIOLOGY, ETC.—Crowell, H. H.—The utilization of certain nitrogenous and carbohydrate substances by the southern armyworm, Prodenia eridania. [7] 34: 503-512, ill. **Day, M. F.**—Pigment migration in the eyes of the moth, Ephestia kuehniella. [Biol. Bull.] 80: 275-291, ill. **Dethier, V. G.**—The function of the antennal re-

ceptors in lepidopterous larvae. [Biol. Bull.] 80: 403-414, ill. **Evans, J. W.**—Morphology of Tettigareta tomentosa (Cicadid.). [Pro. R. S. Tasmania] 1940: 35-49, ill. **Hardman & Craig.**—A physiological basis for the differential resistance of the two races of red scale to HCN. [68] 94: 187. **Henke & Mertz.**—Ueber die kerngrossenunterschiede im flugelepithel der mehlmotte und ihre beziehungen zur grossendifferenzierung der schuppen. [97] 61: 40-64, ill. **Hungate, R. E.**—Experiments on the nitrogen economy of termites. [7] 34: 467-489. **Kuhn, A.**—Zur entwicklungsphysiologie der schmetterlingsschuppen. [97] 61: 109-147, ill. **Lotmar, R.**—Das mitteldarmepithel der raupe von Tineola biselliella, insbesondere sein verhalten während der Häutungen. [41] 18: 233-248, ill. **Timofeeff-Ressovsky, H. A.**—Temperaturmodifikabilitat des zeichnungsmusters bei verschiedenen populationen von Epilachna chrysomelina. [97] 61: 68-84, ill. **Vargas, L.**—Detalles morfologicos de los Anopheles americanos del grupo maculipennis y especies proximas. [121] 2: 23-25, ill. Detalles morfologicos poco o nada conocidos de Anopheles mexicanos [121] 2: 66-69, ill. **Vogt, M.**—Anatomie der pupalen Drosophilaringdruse und ihre mutmassliche bedeutung als imaginales metamorphosezentrum. [97] 61: 148-158, ill. See also under Diptera, various authors.

ARACHNIDA AND MYRIOPODA.—Archer, A. F.—The Argiopidae or orb-weaving spiders of Alabama. [Geol. Surv. Alabama] Mus. Pap. 14: 77 pp., ill. (*). **Chamberlin, R. V.**—New genera and species of American Lithobiid centipeds. [Bull. Univ. Utah] Biol. Ser. 6: 23 pp. New western Millipeds. [Bull. Univ. Utah] Biol. Ser. 6: 23 pp., ill. **Malkin, B.**—New spider records for New York State. [19] 36: 122. **Marshall, R.**—Preliminary list of the Hydracarina of Wisconsin VI. [Trans. Wisc. Acad. Sci. Arts & Letters] 32: 135-165, ill. (*). **de Mello-Leitao, C.**—Anchocoema ogloblini, nova especie de Proscopiida. [15] 13: 99-102, ill. Notas sobre a sistematica das Aranhas, com descricao de algumas novas especies sul Americanas. [15] 13: 103-127, ill. Aranhas do Parana. [14] 11: 235-257, ill. (*).

THE SMALLER ORDERS OF INSECTS.—Buxton, P. A.—Studies on populations of head-lice (Pediculus humanus capitis). [116] 33: 224-242. **Crawford, J. C.**—A new Taeniothrips from Michigan. [10] 43: 142-143. **Leeson, H. S.**—The effect of temperature upon the hatching of the eggs of Pediculus humanus corporis. [116] 33: 243-249.

Ross, H. H.—Descriptions and records of North American Trichoptera. [1] 67: 35-126, ill. **Silvestri, F.**—Tre nuove sp. di Machilellus del Brasile. [14] 11: 545-550 ill.

ORTHOPTERA.—Alexander, G.—Keys for the identification of Colorado Orthoptera. [Univ. Colo. Studies] 1 (D): 129-164, ill. **Chagnon, G.**—The cockroach Supella supellectilium in Quebec (Blattidae). [4] 73: 104. **Deoras, P. J.**—Structure of Hemimerus deceptus var. ovatus; an external parasite of Cricetomys gambiense. [116] 33: 172-185, ill. **Rehn, J. A. G.**—A new Californian species of Gammarotettix (Gryllacrididae). [Notulae Nat.] No. 85: 4 pp., ill. **Shotwell, R. L.**—Life histories and habits of some grasshoppers of economic importance on the Great Plains. [U. S. Dept. Agric.] Tech. Bull. No. 774: 47 pp., ill.

HEMIPTERA.—Barber, **H. G.**—Descr. of a new bat bug (Cimicid.). [91] 31: 315-317. **de Carlo, J. A.**—Descripcion de tres especies nuevas del genero Cryphocricus. Una nueva especie del genero Heleocoris (Naucoridae). [104] 10: 426-433, ill. **Drake & Harris.**—Concerning some Halobalinids from western Hemisphere (Gerridae). [Iowa Sta. Jour. Sci.] 15: 237-240. (s*). **da Fonseca, J. F.**—Contribuicao para o conhecimento dos membracideos neotropicos III. [14] 11: 133-138 (*). **Harrington, C. D.**—Influence of aphid resistance in peas upon aphid development, reproduction and longevity. [47] 62: 461-466, ill. **Harris & Drake.**—Notes on the family Mesoveliidae with descr. 2 n. sps. [Iowa State Jour. Sci.] 15: 275-277. (s*). **Harris, H. M.**—Concerning Neididae, with new species and new records for North America. [19] 36: 105-109. **Hausman, S. A.**—Leaf-mining insects. [Sci. Monthly] 53: 73-75, ill. **Knight, H. H.**—N. sps. of Lygus from West. U. S. (Miridae). [Iowa State J. Sci.] 15: 269-273. (*). **Knowlton, G. F.**—Studies of western aphids. [Pro. Utah Acad. Sci. Arts & Letters] 18: 41-44. **deLong, D. M.**—The gen. Arundanus in N. Am. (Cicadellid.). [119] 25: 632-643. (*). **Monte, O.**—Tingitideos novos pouco conhecidos da fauna Americana. Notas sobre Gargaphia subpilosa. [14] 11: 283-300, ill.; 301-308, ill., (s*). **Morrison, H.**—A new Steatococcus from Mexico. [10] 43: 140-141. **de Toledo, A. A.**—Notas sobre a biologia do Chrysomphalus aonidum no Estado de S. Paulo, Brasil. [14] 11: 559-78, ill. **de la Torre-Bueno, J. R.**—Remarks on the genus Corizus of authors, not of Fallen. [7] 34: 284-288. (k). **Usinger, R. L.**—The present status and synonymy of some Orsilline species

(Lygaeidae). [19] 36: 129-132.

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ATLAS OF THE SCALE INSECTS OF NORTH AMERICA, by GORDON FLOYD FERRIS, Professor of Zoology, Stanford University. Series III, 269-384. Stanford University Press. Published March 27, 1941. Price bound $7.75, unbound $6.75. —In the NEWS for May, 1937, page 150, and for October, 1939, pages 238-239, we have noticed respectively the appearance of Series I and II of this Atlas. The present series continues in the style of its predecessors and is devoted to the Tribes Diaspidini (23 genera, 11 of them new, with 5 previously described and 40 new species) and Aspidiotini (13 genera, 3 of them new, with 26 previously described and 24 new species). Many of the new species are based on material collected by the author in his expedition of 1938 from California to Panama. Members of both the tribes here represented also appeared in the earlier series.—P. P. CALVERT.

BUTTERFLIES. A handbook of the butterflies of the United States, complete for the region North of the Potomac and Ohio Rivers and East of the Dakotas, by RALPH W. MACY and HAROLD H. SHEPARD. Published by the University of Minnesota Press, Minneapolis. 8 vo. Cloth, 247 pp., 4 colored plates and many text illustrations. Price, $3.50.—Dr. Macy is the author of many technical papers on biological subjects, as is Dr. Shepard, as well as the Hesperidae section of the Catalogus Lepidopterorum; the completion of which is unfortunately interrupted by the war.

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INSECT PESTS OF STORED GRAIN AND GRAIN PRODUCTS, IDENTIFICATION, HABITS AND METHODS OF CONTROL, by RICHARD T. COTTON, Senior Entomologist, Bureau of Entomology and Plant Quarantine, U. S. Department of Agriculture. 8 vo., photo offset, flexible binding, 242 pp., illus., Minneapolis, Minn., Burgess Publishing Company, 1941, $3.00. —This is a compact, practical handbook prepared for ready reference use of farmers, elevator operators, shippers, millers and all others who are engaged in the storage, shipping and processing of grain, as well as manufacturers and users of pest control supplies. It has been estimated that as a result of their feeding activities, their presence in grain and cereal products and the cost of methods employed to destroy them, this group of insects exacts a toll yearly of at least $300,000,000 in the United States alone. In order intelligently to combat these insects it is essential to possess a knowledge of their life histories, habits and environmental needs. In order to acquaint

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OBITUARY

The death, on July 17, 1941, of Professor MYRON HARMON SWENK, chairman of the department of entomology of the University of Nebraska since 1919, was announced in *Science* for August 8. He was born at Polo, Illinois, August 8, 1883, and received the A.B. (1907) and A.M. (1908) degrees from the University of Nebraska, with which his professional life was continuously spent. His entomological interests were on the pollination of plants by insects and the taxonomy of bees. He contributed descriptions of a new *Colletes* to volume 15 of the NEWS (1904) and of other species of the same genus to the volume for 1906, and of species of the genus *Anthophora* to that for 1909.—P. P. CALVERT.

EXCHANGES

This column is intended only for wants and exchanges, not for advertisements of goods for sale or services rendered. Notices not exceeding three lines free to subscribers.

These notices are continued as long as our limited space will allow; the new ones are added at the end of the column, and, only when necessary those at the top (being longest in) are discontinued.

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Wanted—Specimens of the genus Trox from North America. Will exchange or determine for duplicate material. Mark Robinson, 231 Cherry St., Sharon Hill, Pennsylvania.

Lepidoptera—From the South, including P. palamedes, T. halesus and E. jucunda to exchange for fauna from other localities. H. W. Eustis, Woodbine Rd., Lakemont, Augusta, Georgia.

Wanted—Egg cases of preying mantids. Correspondence desired with those who will collect. Osmond P. Breland, Department of Zoology, The University of Texas, Austin, Texas.

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